

Respecting the first of these animals, the statement that "only one species of buffalo (*Bubalus caffer*) is found in the southern part of Africa," is confirmatory of the results arrived at by all other investigators. Their abundance and ferocity when charging are much emphasised.

Our knowledge of the African rhinoceroses is much more imperfect than that of their Indian allies, and Mr. Drummond's remarks on these animals must be looked upon as those of a reliable and acute observer. We read: "As far as my experience and inquiries have gone, I believe, in accordance with the recorded opinions of most travellers and sportsmen who have given any attention to the subject, that there are four—two of the so-called 'white,' and two of the 'black.'" The way in which these four species are arrived at, presents one point, at least, of special interest. The first species is the *Rhinoceros bicornis*, "borele" or "upetyane," the smallest and most dangerous of the four, it alone being in the habit of attacking man unprovoked. The second is the *R. keitloa*, the "keitloa" or "umkombe tovot," the next largest, with the hind horn, which is quite small in all the others, very nearly as big as, or even sometimes bigger than, the fore one. In one specimen "the horns, which were unusually good, measured twenty-four inches for the front one, twenty for the back." The third species is the *R. simus*, "umkave," or common white rhinoceros, the largest of all; it is "remarkable for the great length the front horn grows to, as well as for its gentle and inoffensive disposition." With this is united as a variety *R. oswellii*, in which the front horn is particularly long and turns forwards; and we are well disposed to agree with Mr. Drummond in thus laying little or no stress on peculiarities in the horns when they are not associated with other characters. For a knowledge of the last species we have to rely entirely on our author. It has an independent native name, which is in its favour, being known as the "Kulumane." It "differs from the other species (*R. simus*) in three important particulars: firstly, in its horns, which, though following the conformation of *R. simus*, never attain to the same size; secondly, in its measurements, which, while considerably inferior to those of the common white, are greater than those of the other two species, while it is to be noted that it possesses, though in a less marked degree, the long and prehensile upper lip which characterises *R. bicornis* and *R. keitloa*; thirdly, in its food, for though preferring, as was to be expected from the formation of its snout, the young tender shoots and leaves of thorns, it also resembles *R. simus* in consuming large quantities of grass. In its disposition it would seem to combine the characteristics of the other species."

The author was fortunate enough to capture and keep alive for a short time a very young individual of the last-described species, and he tells us that "if a specimen were really wanted for this country [which most certainly is the case], and there is not a single one as yet, I have no doubt that the difficulty of finding a substitute for its mother's milk—a serious one in a land where cattle do not exist on account of the tsetse—might be got over by the sacrifice of the lives of a few cows, for, as the bite of this insect does not cause immediate death . . . they might be brought down to the plains, and would probably live long enough to take the young rhinoceros to the higher dis-

tricts, where plenty of milk could be procured." It is much to be regretted that Mr. Drummond was not able to employ the method he thus describes so clearly, and so put us in possession of an invaluable zoological treasure.

The light thrown on the question as to whether the striped eland is a species differing from the unstriped animal is but small, the author's experience being in favour of there being but one. Both varieties are met with in Amatonga. As to the elephant, its difference from its Asiatic brother in the conformation of its skull produces an important difference in the hunter's point of view also. In the Indian species "the forehead presents a certain mark, while in Africa it is quite impervious." The following observations will also be read with painful interest. "Slowly, but surely, this most useful animal is being extirpated, merely for the purpose of supplying Europe with ivory ornaments and billiard-balls, and before many years are over the inhabitants of Africa will grieve, when it is too late, at the short-sighted policy which has allowed them, for the purposes of immediate gain, to kill down the only animal capable of becoming a beast of burden through the tsetse-infected districts of that continent." The extreme difficulty of taming the animal, the impossibility of breeding it in captivity, and the rapid advance in steam-locomotive power, must, however, be placed in the balance against the advantages which the creature offers.

The portion of the work devoted to the lion and the leopard abounds in incidents, many of which terminated fatally; so many, indeed, that we can hardly understand how it is that the author places the upetyane (*Rhinoceros bicornis*) before the lion in comparing the different shades of danger encountered from the larger varieties of South African animals.

In conclusion, we strongly recommend this book to all who are fond of sport and who require practical hints on minor details before commencing a similar undertaking. To the student of Natural History it will be equally attractive, because of the clear and pleasing manner in which it depicts the manners and habits of several animals in their native haunts, nothing respecting which can be gained from any amount of study of the dry skins or skeletons. It is by his knowledge of the habits of the creatures which he is accustomed to meet, that the practical naturalist can frequently put the museum-student to shame, and for this reason we think that works like the one before us ought to be studied by zoologists.

Some of the illustrations are good, but many of them are quaint and not always accurate. Why the head of a Zebra introduces the chapter on the Eland, and an Aard Wolf does the same with respect to the Leopard, we are at a loss to understand.

**BRUSH'S "DETERMINATIVE MINERALOGY"**  
*Manual of Determinative Mineralogy, with an Introduction on Blowpipe Analysis.* By George J. Brush, Professor of Mineralogy in the Sheffield Scientific School. (New York: John Wiley and Son, 1875.)

PROF. BRUSH has endeavoured to make the study of mineralogy lighter than usual, and has in many respects succeeded, but unfortunately for the modern

student he has retained the old chemical formulæ. Surely it would have been better to swim with the times and adopt the new atomic weights, taking care to abolish all doubtful tests, and adding the latest and most accurate methods of analysis. Many of the latest and most delicate methods of mineral analysis are entirely omitted, such as Bunsen's methods for the detection of arsenic, antimony, selenium, molybdenum, uranium, &c. The work in question is divided into two distinct parts; the first containing descriptions of the different apparatus and reagents used, and a "Systematic Course of Blowpipe Analysis;" the second, styled "Determinative Mineralogy," makes use of the knowledge acquired in the first part to determine the mineral species under examination. The "Systematic Course of Blowpipe Analysis" is adapted from the later editions of Plattner's work on Blowpipe Analysis, edited by his successor, Prof. Richter; the "Determinative Mineralogy" is a translation of Von Kobell's "Tafeln zur Bestimmung der Mineralien," tenth edition. Generally speaking, students do not take kindly to "Tables," but Prof. Brush has made them more inviting by arranging the minerals having the same base into groups, and studying them in order. This is an excellent arrangement, and the distinguished author deserves the gratitude of students for thus lightening their labours. Too many mineralogical works of the present day exhibit a harum-scarum kind of classification, which simply bewilders the inquiring student and leaves him in greater confusion than before. The first part of the work opens with descriptions of various kinds of blowpipes, and the manner of using them, also the fuel used to obtain the requisite flame. Here, under the headings "Reducing" and "Oxidising" flames, are described very clearly the characters of the two flames, with very good engravings showing the zones. The methods for preparing the various reagents required are trivial and should have been omitted; for instance, we are told to prepare pure carbonate of soda by taking "four or five ounces of *commercial* bicarbonate of soda *free from mechanical impurities*," &c. We should be glad to know where Prof. Brush obtains his commercial bicarbonate of soda so free from impurity, as the manufacturer deserves encouragement. Chapter II. commences the "Systematic Course of Qualitative Blowpipe Analysis," describing the reactions of the elements and their combinations in the "closed tube and open tube," and on "Charcoal as a support." Under the latter heading a very neat and novel method is given for overcoming the great difficulty experienced sometimes in keeping the assay in its place on the charcoal. Let those who wish to work in comfort for the future buy the book, and find the method therein.

Further on, the colours imparted to a flame by different metallic salts are described, but all of them, with the exception of copper, sodium, potassium, lithium, and calcium, might have been left out with perfect justice, for no one could decide what metal was present from a simple examination of the coloured flame as described; that could only be done by means of the spectroscope. Then follow "The uses of Fluxes and Roasting," and "Fusion with Borax," which are simply adaptations from Plattner, and the tables given in this division are literal translations from the same author, which may also be said of the division

"Fusion with Salt of Phosphorus." It is only fair to say that in the preface to his book Prof. Brush states: "The main authorities used in the original preparation and later revision of the chapters on blowpipe analysis were the works of Berzelius and Plattner. The third and fourth editions of Plattner, the latter edited by Prof. Richter, have been chiefly consulted." The whole work seems to confine itself almost entirely to blowpipe analysis by the dry method, ignoring very frequently much easier and quicker methods of detection by the wet method of analysis. A few instances may be given, viz., copper when associated with nickel, cobalt, iron, and arsenic by the dry method, proceed as follows:—"Separate *most* of the cobalt and iron by treating with borax on charcoal, the remaining metallic globule is fused with pure lead, and then boric acid is added; this last dissolves the lead and the rest of the cobalt and iron, while most of the arsenic is volatilised. The cupriferous nickel globule which still may contain a little arsenic is treated with salt of phosphorus in the oxidising flame; the bead obtained will be dark green while hot, and clear green when cold. This last green is caused by a mixture of the yellow of oxide of nickel and the blue of oxide of copper." What a complicated and tedious process! Now let us consider the wet method well known to chemists, but not mentioned amongst the "characteristic reactions" in the first part of this book. Dissolve the mineral in nitric acid or nitro-hydrochloric acid, get rid of the excess of nitric acid, precipitate the copper by means of sulphuretted hydrogen, dissolve this precipitate in nitric acid, and add excess of ammonia, when the liquid at once acquires the splendid well-known blue colour. The arsenic will be present as arseniate of ammonia, and will not interfere with the reaction. Even more easily can traces of copper be detected by Bunsen's neat method, as follows:—Fuse the assay on a charcoal match with carbonate of sodium in the reducing flame, treat the fused mass with distilled water in a porcelain basin, gather together (by means of a small magnet) the metallic particles of cobalt, nickel, and iron, and remove them; dissolve the remaining metallic copper in nitric acid; take up a drop of this solution by means of a glass rod and place it upon a strip of white filter-paper, add a drop of ammonia to the moistened paper, and observe the decided blue colour where the drop of solution was placed. Thus, by the time the student had blundered through the dry method of discovering copper, a skilful chemist would almost have determined the percentage of copper present in the assay by some volumetric process. Singularly enough, the above method is mentioned several times *incidentally* in the second part, entitled "Determinative Mineralogy." Under the heading "Iron," no mention is made of the well-known reaction between ferric salts and ferrocyanide of potassium, but doubtful borax bead reactions are very prominent. The characteristic precipitate obtained by mixing soluble lead salts with bichromate of potassium is omitted also. Chapter IV. opens with "Determinative Mineralogy." These tables are the best part of the book. The student must be very dull indeed who fails to determine a mineral by the use of them. The method of studying the different minerals is excellent, as the specimen under examination is soon brought into a group; and by glancing at the characteristics of each mineral in that group, and com-

paring the reactions obtained with the specimen, the name is ascertained without difficulty. An example will suffice to show this:—"The mineral has a metallic lustre. Its degree of fusibility is 2, and a portion of it is readily volatile, evolving the garlic-like smell peculiar to arsenical minerals. On looking at the tables it is found to belong to Division I. Fused with carbonate of sodium on charcoal in the reducing flame, no metallic globule is obtained, but the reaction for sulphur is seen on moistening the fused mass and placing it upon a piece of silver. Does not give the reactions for copper or cobalt. In the closed tube gives metallic arsenic, and after long heating becomes magnetic. It is found that it can only be one of two minerals, viz., Arsenopyrite (mispickel) or Lőlingite. The streaks, colour, and hardness are the same; but two reactions observed before prove it to be arsenopyrite, for it fuses at 2, and gives a strong sulphur reaction." As we have pointed out, it might have been expected that so distinguished a mineralogist as Prof. Brush would have given us all the more modern methods, but, nevertheless, his book is certainly a very useful one, and may be recommended to the student. CHARLES A. BURGHARDT

#### OUR BOOK SHELF

*Elementary Chemistry.* By F. S. Barff, M.A. (London: Edward Stanford, 1875.)

THE question which naturally occurs to one on opening this book is, Why was it written? Of late we have had so many books professing to teach elementary chemistry, and some of these really fulfilling their profession, that it is hard to understand why another should be added to the list. In his preface the author says: "This book, as far as it goes, professes to enable the attentive student to acquire a sound knowledge of the very elementary facts concerning the most important of the 'non-metallic elements,' as they are called." Again, he expresses the belief that by the system he has adopted, "boys will have their reasoning faculties strengthened and their powers of observation rendered accurate and acute."

So far as mere facts are concerned, this book appears to be very trustworthy; the author is evidently well acquainted with his subject; but there is a want of principles to guide the student. If chemistry is to be taught thoroughly, even in its elements, the method of teaching adopted must from the very beginning be a scientific method; it must seek not only to inculcate accuracy of knowledge in detail, but also to point out the generalised expressions which bind together the facts into a connected system. By studying the book before us a boy may certainly gain a considerable amount of good and useful knowledge, but we are afraid that his ideas of what chemical science is will be at best but vague. The author does not appear to have clearly set before himself the end which he desired to secure by writing a book on elementary chemistry. If that end was merely to supply a collection of useful facts about various chemical substances and processes, he has succeeded; but books already existed which supplied this want. If he wished to supply sound chemical knowledge, so far as the book goes, he must be said also to have succeeded, but unfortunately he has stopped too soon; the fault is that it does not go quite far enough: a little more carefulness in planning the book, and the introduction of at least a few generalisations to explain the facts, would have added vastly to the value of the book as an elementary educational work. If we compare this little book with others which might be named which cover much the same ground, the want of general ideas to guide the student becomes very apparent.

Another question which occurs in connection with a book on chemistry specially intended for the use of boys at school is, Are schoolboys as a rule really interested in this science? Is it found generally advisable to devote any large portion of a schoolboy's time to the study of chemistry; or is it better, when natural science is introduced into a school curriculum, to choose physics as the principal subject-matter for study?

M. M. P. M.

*Travels in Portugal.* By John Latouche. With Illustrations by the Right Hon. T. Sotherton-Estcourt. (London: Ward, Lock, and Tyler.)

MR. LATOUCHE'S narrative is full of interest and instruction; but why has he not indicated the year or years during which he travelled in Portugal? There is even no date on the title-page. We hope Mr. Latouche will supply the necessary dates in a second edition. The author refers with justice to the general ignorance of Portugal and of its people; many, no doubt, suppose they are a sort of degraded Spaniards, whereas we think it is pretty clear, from the information contained in the work before us, that the Portuguese are in many respects superior to their neighbours. Mr. Latouche evidently knows Portugal well, and has carefully observed the characteristics of its people. In his narrative he wisely gives very few details about the beaten tracks, but describes principally what he saw in districts which are never visited by the ordinary traveller. His work contains much information concerning the people, their ethnology, language, manners, customs, superstitions, and history; about the country itself, its physical features, its natural history, the state of agriculture, and other points of interest. As to the ethnology of Portugal, Mr. Latouche seems to believe that the people are an agglomeration of a greater variety of elements than that of any other country in Europe, and that these elements still remain to a large extent heterogeneous, different elements preponderating in different districts—Celts, Iberians, Phœnicians, Romans, Visigoths, Saracens, Greeks, French, and Jews all contributing their quota. As an illustration of the extensive infusion of Jewish blood throughout all ranks of the people, Mr. Latouche tells the following anecdote:—"When that foolish bigot, King Joseph, proposed to his minister Pombal that all Jews in his kingdom should be compelled to wear white hats as a distinctive badge, that sagacious minister made no objection, but when next he appeared in Council it was with two white hats—one for his Majesty and one for himself," explained Pombal, and the King said no more about his proposal." With regard to the natural history of Portugal, Mr. Latouche thinks there is much still to be learned; that, in fact, it has been less studied than that of any other country in Europe. There is no doubt much truth in this, but we hope it will not be necessary for any foreign "patient naturalist" to learn the language, as Mr. Latouche suggests, in order to investigate the natural history of Portugal. Surely there is a sufficient number of competent men in the country itself to undertake the task, if their attention were directed to the importance of having it accomplished. Indeed, we believe there have not been wanting signs recently of an awakening of intellectual life in Portugal, and we hope that one of its results will be a thorough investigation of the natural history of the country, as well as a vast improvement in the wretched system of education which prevails. The Portuguese, as our readers know, were at one time one of the most enterprising people in Europe, and under proper guidance might still occupy an honourable position among the nations.

To those who wish to obtain some trustworthy information concerning the present condition of Portugal, we commend Mr. Latouche's work, which, we may state, is enlarged from a series of articles which were published in the *New Quarterly Magazine*.